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National Eutrophication Survey, Las Vegas, Nev

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NATIONAL EUTROPHICATION SURVEY

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16. ABSTRACT Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.		

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Report

on

Douglas Lake

Sevier, Jefferson, and Cocke Counties

Tennessee

EPA Region IV

Working Paper No. 447

With the cooperation of the

Tennessee Department of Public Health

and the

Tennessee National Guard

September 1976

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point source discharge reduction and nonpoint source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by the U.S. Environmental Protection Agency and to augment plans implementation by the states.

ACKNOWLEDGMENTS

The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Tennessee Department of Public Health for professional involvement, to the Tennessee National Guard for conducting the tributary sampling phase of the Survey, and to those Tennessee wastewater treatment plant operators who provided effluent samples and flow data.

The staff of the Division of Water Quality Control, Tennessee Department of Public Health; the Division of Environmental Planning, Tennessee Valley Authority; and the Nashville District Corps of Engineers provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper series.

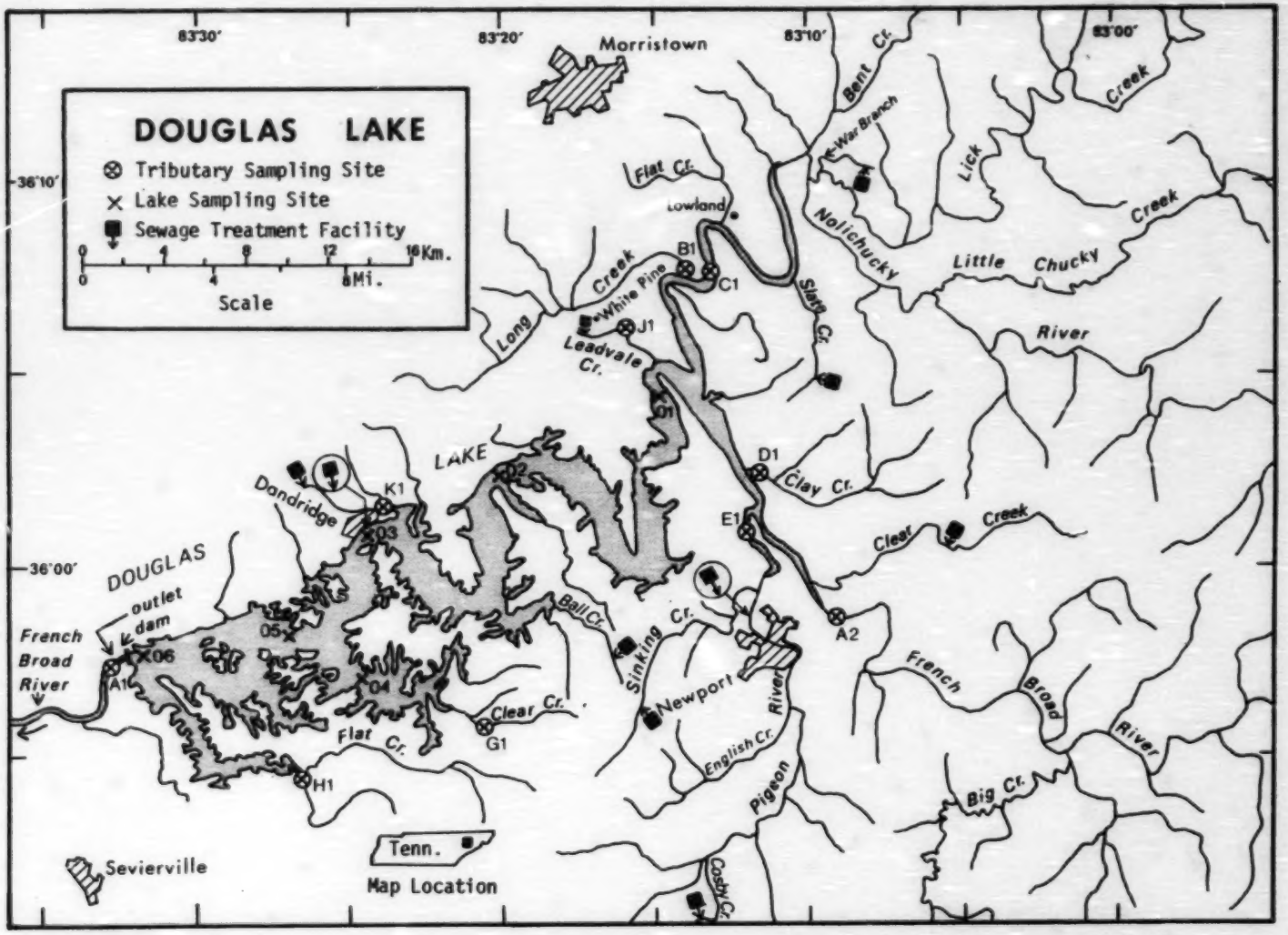
Major General William C. Smith, former Adjutant General of Tennessee, and Project Officer Colonel Wilburn C. Johnson, who directed the volunteer efforts of the Tennessee National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF TENNESSEE

LAKE NAME	COUNTY
Barkley	Stewart, Montgomery (Trigg, Lyon in KY)
Boone	Washington, Sullivan, Carter
Cheatham	Cheatham, Davidson
Cherokee	Jefferson, Hamblen, Grainger, Hawkins
Chickamauga	Hamilton, Rhea, Meigs, McMinn
Douglas	Sevier, Jefferson, Cocke
Fort Loudon	Loudon, Knox, Blount
Great Falls	White, Van Buren
Nickajack	Marion, Hamilton
Old Hickory	Sumner, Davidson, Wilson, Smith, Trousdale
Percy Priest	Davidson, Rutherford
Reelfoot	Obion
South Holston	Sullivan (Washington in VA)
Tims Ford	Moore, Franklin
Watts Bar	Rhea, Meigs, Cumberland, Roane, Loudon
Woods (Elk River)	Franklin, Coffee


DOUGLAS LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
0 4 8 12 16Km.
0 4 8Mi.
Scale
83°30'
83°20'
83°10'
83°00'
36°10'
36°00'
Morristown
Bent Cr.
War Branch
Lick Creek
Flat Cr.
Lowland
Nolichucky
Little Chucky
River
Creek
White Pine
B1
C1
J1
Long
Leadvale Cr.
Slate Cr.
F1
LAKE
D1
Clay Cr.
Dandridge
K1
E1
Clear Creek
DOUGLAS
outlet
dam
French
Broad
River
A1
X06
05
03
04
Ball Cr.
Sinking Cr.
A2
Newport
French Broad River
Clear Cr.
G1
Flat Cr.
H1
English Cr.
Pigeon
Big Cr.
Tenn.
Map Location
Sevierville
Cosby Cr.

REPORT ON DOUGLAS LAKE, TENNESSEE

STORET NO. 4711

I. CONCLUSIONS

A. Trophic Condition:*

Douglas Lake is considered early eutrophic based upon field observations and analysis of Survey data. The lake water was green and turbid with low Secchi disc transparency. Chlorophyll a values ranged from 1.1 µg/l to 8.6 µg/l, with a mean of 4.6 µg/l, and dissolved oxygen concentrations were severely depressed with depth during the summer sampling period. Of the 16 Tennessee lakes sampled in 1973, 11 had greater median total phosphorus, 9 had greater median inorganic nitrogen, and 9 had greater median orthophosphorus than Douglas Lake.

A small amount of higher aquatic plants was reported by Survey limnologists during the field investigation.

B. Rate-Limiting Nutrient:

Algal assay results indicate that Douglas Lake was limited by available phosphorus. Spikes with phosphorus or phosphorus and nitrogen simultaneously resulted in increased assay yields. The addition of nitrogen alone did not stimulate a growth response. Lake data concerning the

*See Appendix E.

ratios of total available inorganic nitrogen to ortho-phosphorus further substantiate these results.

C. Nutrient Controllability:

1. Point sources -

The mean annual phosphorus load from point sources was estimated to be approximately 1.8% of the total load reaching Douglas Lake. The city of Newport contributed a total of 1.4% of the total annual phosphorus load.

The calculated phosphorus loading of 5.55 g $P/m^2/yr$ is about four times that proposed by Vollenweider (1975) as "eutrophic" for a lake with such volume and retention time. Included in this loading are a number of industrial point sources, many of probable nutrient significance, which discharge to the French Broad River, Nolichucky River, and to Pigeon River (see page 15). No information is available on the nutrient contributions of these sources; however, the loads are included in those measured at Stations A-2, C-1, and E-1, respectively. There are also numerous unmeasured municipal and domestic plants upstream of Douglas Lake which discharge to the Nolichucky and French Broad Rivers (Tennessee Department of Public Health, 1975); loadings from these plants were not included due to their distance from the reservoir.

2. Nonpoint sources -

The mean annual phosphorus load not attributable to nearby or sampled point sources was about 98.2% of the total reaching the lake. This phosphorus input is mainly from three major river systems, the French Broad River, Nolichucky River, and Pigeon River which contribute respectively 43.3%, 26.1%, and 27.0% of the total phosphorus load.

Loadings from these rivers are largely attributable to municipal and industrial discharges not sampled by the National Eutrophication Survey. The Tennessee Valley Authority (TVA) in 1973 stated that of the seven major tributary basins in the valley, the French Broad was one of the most seriously polluted in terms of total affected kilometers, having 320 km of streams degraded by pollution. The Nolichucky River receives discharge of tailings from mica washing operations upstream from Douglas Reservoir (Byre, 1970) as well as discharges from the American Enka Corporation, which accounts for 85.7% of the industrial wastewater discharge to the French Broad River Basin (Tennessee Department of Public Health, 1975). The Pigeon River is greatly affected by industrial discharges from the city of Newport.

The phosphorus export rates of the unimpacted tributaries to Douglas Lake are similar to those found in nearby Cherokee Lake (NES Working Paper No. 445).

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

Lake and drainage basin characteristics are itemized below. Lake morphometry data and hydraulic retention time were provided by the Tennessee Valley Authority; tributary flow data were provided by the Tennessee District Office of the U.S. Geological Survey (USGS) (outlet drainage area includes the lake surface area). Tributary drainage area plus the lake surface area do not equal the outlet drainage area probably because of differences in the pool elevations used by the different sources in their calculations. Precipitation values are estimated by methods as outlined in National Eutrophication Survey (NES) Working Paper No. 175. A table of metric/English conversions is included as Appendix A.

A. Lake Morphometry:

1. Surface area: 123.03 km^2.
2. Mean depth: 14.1 meters.
3. Maximum depth: 38.7 meters.
4. Volume: 1,819.412 x 10^6 m^3.
5. Mean hydraulic retention time: 108 days.

B. Tributary and Outlet:
(See Appendix B for flow data)

1. Tributaries -

Name	Drainage area (km^2)	Mean flow (m^3/sec)
A(2) French Broad River	4,812.2	81.43
B(1) Long Creek	92.2	0.89
C(1) Nolichucky River	4,548.0	64.61
D(1) Clay Creek	46.4	0.85
E(1) Pigeon River	1,784.5	36.72
G(1) Clear Creek	26.9	0.50
H(1) Flat Creek	74.1	1.36
J(1) Leadvale Creek	6.7	0.07
K(1) Unnamed Creek	4.2	0.04
Minor tributaries and immediate drainage -	251.2	5.20
Total	11,646.4	191.67
2. Outlet - A(1) French Broad River	11,766.4	182.27

C. Precipitation:

1. Year of sampling: 154.5 cm.
2. Mean annual: 116.2 cm.

III. LAKE WATER QUALITY SUMMARY

Douglas Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from five or six stations on the lake and from a number of depths at each station (see map, page v). During each visit, depth-integrated samples were collected from each station for chlorophyll a analysis and phytoplankton identification and enumeration. During the first visit, two 18.9-liter depth-integrated samples were composited for algal assays. Maximum depths sampled were 8.8 meters at Station 1, 16.5 meters at Station 2, 28.4 meters at Station 3, 22.9 meters at Station 4, 29.0 meters at Station 5, and 35.1 meters at Station 6. For a more detailed explanation of NES methods, see NES Working Paper No. 175.

The results obtained are presented in full in Appendix C and are summarized in III-A for waters at the surface and at the maximum depth for each site. Results of the phytoplankton counts and chlorophyll a determinations are included in III-B. Results of the limiting nutrient study are presented in III-C.

DOUGLAS RESERVOIR
STORET CODE 4711

PHYSICAL AND CHEMICAL CHARACTERISTICS

PARAMETER	(5/25/73) S*** = 6 N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	(8/23/73) S*** = 6 N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	(10/27/73) S*** = 5 N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)
TEMPERATURE (DEG CENT)												
0.-1.5 M DEPTH	12	20.1- 72.0	36.1	0.0- 1.2	6	30.0- 76.0	62.5	0.0- 0.0	10	19.0- 54.0	28.6	0.0- 1.5
MAX DEPTH**	6	12.7- 20.1	13.3	8.8- 29.0	6	17.1- 24.6	23.0	7.9- 35.1	5	16.4- 20.5	18.2	7.0- 23.8
DISSOLVED OXYGEN (MG/L)												
0.-1.5 M DEPTH	6	8.2- 9.4	9.0	1.2- 1.2	5	6.2- 7.8	6.6	0.0- 0.0	5	4.8- 8.8	6.2	1.5- 1.5
MAX DEPTH**.	6	4.6- 7.4	6.3	8.8- 29.0	6	0.0- 6.0	0.1	7.9- 35.1	5	3.6- 6.0	3.8	7.0- 23.8
CONDUCTIVITY (UMHOS)												
0.-1.5 M DEPTH	12	148.- 160.	150.	0.0- 1.2	6	155.- 179.	166.	0.0- 0.0	10	177.- 195.	182.	0.0- 1.5
MAX DEPTH**	6	149.- 175.	150.	8.8- 29.0	6	155.- 224.	181.	7.9- 35.1	5	175.- 308.	215.	7.0- 23.8
PH (STANDARD UNITS)												
0.-1.5 M DEPTH	12	7.7- 8.4	7.8	0.0- 1.2	6	7.5- 8.6	8.1	0.0- 0.0	10	7.1- 8.1	7.4	0.0- 1.5
MAX DEPTH**	6	7.4- 7.6	7.4	8.8- 29.0	6	6.8- 7.1	6.9	7.9- 35.1	5	6.9- 7.4	7.0	7.0- 23.8
TOTAL ALKALINITY (MG/L)												
0.-1.5 M DEPTH	12	38.- 56.	46.	0.0- 1.2	6	43.- 49.	45.	0.0- 0.0	10	42.- 48.	45.	0.0- 1.5
MAX DEPTH**	6	42.- 58.	48.	8.8- 29.0	6	35.- 60.	54.	7.9- 35.1	5	44.- 58.	46.	7.0- 23.8
TOTAL P (MG/L)												
0.-1.5 M DEPTH	12	0.019-0.057	0.023	0.0- 1.2	6	0.010-0.048	0.014	0.0- 0.0	10	0.018-0.044	0.023	0.0- 1.5
MAX DEPTH**	6	0.033-0.074	0.043	8.8- 29.0	6	0.033-0.240	0.076	7.9- 35.1	5	0.043-0.125	0.090	7.0- 23.8
DISSOLVED ORTHO P (MG/L)												
0.-1.5 M DEPTH	12	0.003-0.035	0.008	0.0- 1.2	6	0.004-0.017	0.006	0.0- 0.0	10	0.011-0.016	0.014	0.0- 1.5
MAX DEPTH**	6	0.019-0.041	0.027	8.8- 29.0	6	0.005-0.083	0.011	7.9- 35.1	5	0.014-0.030	0.020	7.0- 23.8
NO2+NO3 (MG/L)												
0.-1.5 M DEPTH	12	0.340-0.550	0.365	0.0- 1.2	6	0.100-0.240	0.130	0.0- 0.0	10	0.230-0.320	0.245	0.0- 1.5
MAX DEPTH**	6	0.380-0.700	0.465	8.8- 29.0	6	0.060-0.560	0.150	7.9- 35.1	5	0.150-0.430	0.330	7.0- 23.8
AMMONIA (MG/L)												
0.-1.5 M DEPTH	12	0.030-0.160	0.040	0.0- 1.2	6	0.060-0.090	0.060	0.0- 0.0	10	0.040-0.050	0.045	0.0- 1.5
MAX DEPTH**	6	0.070-0.290	0.080	8.8- 29.0	6	0.130-1.710	0.500	7.9- 35.1	5	0.110-0.240	0.220	7.0- 23.8
KJELDAHL N (MG/L)												
0.-1.5 M DEPTH	12	0.200-0.700	0.400	0.0- 1.2	6	0.300-0.500	0.450	0.0- 0.0	10	0.200-0.500	0.350	0.0- 1.5
MAX DEPTH**	6	0.200-0.600	0.350	8.8- 29.0	6	0.300-2.300	0.850	7.9- 35.1	5	0.400-0.800	0.500	7.0- 23.8
SECCHI DISC (METERS)												
	0	***** *****	*****		0	***** *****	*****		0	***** *****	*****	

* N = NO. OF SAMPLES
** MAXIMUM DEPTH SAMPLED AT EACH SITE
*** S = NO. OF SITES SAMPLED ON THIS DATE

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
05/25/73	1. Flagellates	708
	2. Melosira	94
	3. Stephanodiscus	94
	4. Asterionella	73
	5. Nitzschia	62
	Other genera	217
	Total	1,248
08/23/73	1. Nitzschia	4,913
	2. Flagellates	648
	3. Oscillatoria	342
	4. Synedra	342
	5. Scenedesmus	180
	Other genera	306
	Total	6,731
10/27/73	1. Flagellates	724
	2. Melosira	559
	3. Nitzschia	428
	4. Stephanodiscus	164
	5. Trachelomonas	132
	Other genera	396
	Total	2,403

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
05/25/73	1	8.3
	2	1.8
	3	2.4
	4	3.7
	5	2.7
	6	4.2
08/23/73	1	8.6
	2	5.5
	3	4.2
	4	5.8
	5	5.2
	6	7.0
10/27/73	1	---
	2	5.8
	3	6.0
	4	3.4
	5	1.7
	6	1.1

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)
Stations 1, 2, 3			
Control	0.020	0.474	4.2
0.05 P	0.070	0.474	9.9
0.05 P + 1.0 N	0.070	1.474	12.2
1.00 N	0.020	1.474	3.6
Stations 4, 5, 6			
Control	0.012	0.546	0.2
0.05 P	0.062	0.546	11.1
0.05 P + 1.0 N	0.062	1.546	16.8
1.00 N	0.012	1.546	0.2

2. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential for primary productivity in Douglas Lake was high at Stations 1, 2, and 3, and low at Stations 4, 5, and 6 at the time of sampling, probably due to the proximity of Stations 1 through 3 to the municipal waste sources impacting Douglas Lake. The increased growth of the test alga in response to the addition of orthophosphorus, as well as the lack of response to the addition of nitrogen, indicates phosphorus limitation. Maximum yield was achieved with the simultaneous addition of both phosphorus and nitrogen.

The ratios of the mean total available inorganic nitrogen to orthophosphorus for the spring, summer, and fall samplings were respectively 31/1, 43/1, and 24/1, further indicating phosphorus limitation.

IV. NUTRIENT LOADINGS
(See Appendix D for data)

For the determination of nutrient loadings, the Tennessee National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff month of February when two samples were collected. Sampling was begun in April 1973 and was completed in March 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Tennessee District Office of the USGS for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries, except Leadvale Creek and Unnamed Creek, Stations J(1) and K(1), were determined by using a modification of a USGS computer program for calculating stream loadings. Nutrient loads indicated for tributaries are those measured minus known point source loads, if any.

Nutrient loadings for Leadvale Creek, Unnamed Creek, and unsampled "minor tributaries and immediate drainage" ("ZZ" of USGS) were estimated by using the mean annual nutrient loads, in kg/km^2/yr, for Long Creek, Clay Creek, and Flat Creek at Stations B(1), D(1), and H(1), and multiplying the mean by the appropriate drainage area in km^2.

The operator of the White Pine wastewater treatment plant provided monthly effluent samples and corresponding flow data. Municipal nutrient loads for the Dandridge, Ramada Inn, Newport and Jefferson County Nursing Home wastewater treatment plants were estimated at 1.134 kg P and 3.401 kg N/capita/yr. Nutrient loads for the five included elementary and high schools and were estimated at 0.567 kg P and 1.701 kg N/capita/yr (covers 180 days).

A. Waste Sources:

1. Known municipal:*

Name	Pop. Served	Treatment	Mean Flow ($m^3/d \times 10^3$)	Receiving Water
White Pine	1,270	Extended aeration	0.661	Leadville Creek
Dandridge	250	Contact stabilization	0.095†	Unnamed Creek/ French Broad River
Newport††	7,000	Trickling filter	2.650	Pigeon River
Jefferson County Nursing Home	90	Tertiary	0.034†	Tributary to French Broad River
Cosby High School	415	Extended aeration	0.157†	Cosby Creek/ Pigeon River
Edgemont Elementary School	765	Tertiary	0.290†	Sinking Creek
Parrotsville School	994	Extended aeration	0.376†	Clear Creek
Centerview Elementary School	331	Extended aeration	0.125†	Slate Creek
Ramada Inn (Newport)	290	Tertiary	0.110†	Bell Creek/ Douglas Lake
McDonald Elementary School	486	Extended aeration	0.184†	War Branch/ Tick Creek

2. Known industrial:**

At least 10 industries discharge to the immediate Douglas Reservoir drainage basin, many of which are of probable nutrient significance. American Enka Corporation, which accounts for most of the industrial wastewater discharge to the French Broad River basin, impacts Flat Creek. A. G. Lawrence Leather Company, Stokely VanCamp Incorporated, American Limestone Division, Newport Industrial Products, Sonoco Products Company, and Newline Corporation impact Pigeon Creek. Arapahoe Corporation, Haywood-Wakefield Company, and Vernco, Incorporated impact Sinking Creek. In addition to these, there are a number of industrial plants further upstream the Nolichucky River and its tributaries. Because data on the discharges are not available, these sources are not listed on the following loading pages; however, their nutrient loads, if any, are included in the respective tributary loads.

*Treatment plant questionnaires; Tennessee Department of Public Health, 1975.
**Tennessee Department of Public Health, 1975.
†Estimated at 0.3785 m^3/capita/day.
††60% of the total waste load contributed by canning industry.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/yr	% of total
a. Tributaries (nonpoint load) -		
A(2) French Broad River	295,245	43.3
B(1) Long Creek	780	0.1
C(1) Nolichucky River	178,200	26.1
D(1) Clay Creek	860	0.1
E(1) Pigeon River	184,090	27.0
G(1) Clear Creek	2,820	0.4
H(1) Flat Creek	1,340	0.2
J(1) Leadvale Creek	100	<0.1
K(1) Unnamed Creek	65	<0.1
b. Minor tributaries and immediate drainage (nonpoint load) -	3,770	0.6
c. Known municipal STP's -		
White Pine	2,515	0.4
Dandridge	285	<0.1
Newport	7,940	1.2
Jefferson County Nursing Home	100	<0.1
Cosby High School	235	<0.1
Edgemont Elementary School	435	0.1
Parrotsville Elementary and High School	565	0.1
Centerview Elementary School	190	<0.1
Ramada Inn	330	<0.1
McDonald Elementary School	275	<0.1
d. Septic tanks* -	75	<0.1
e. Known industrial - See discussion, page 15.		
f. Direct precipitation** -	2,155	0.3
Totals	682,370	100.0
2. Output - A(1) French Broad River	286,690	
3. Net annual P accumulation -	395,680	

*Estimate based on 252 lakeside residences, 2 parks, and 1 camp.
**Estimated (see NES Working Paper No. 175).

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (nonpoint load) -		
A(2) French Broad River	4,231,800	46.4
B(1) Long Creek	42,000	0.5
C(1) Nolichucky River	2,410,755	26.4
D(1) Clay Creek	26,410	0.3
E(1) Pigeon River	2,012,400	22.0
G(1) Clear Creek	26,720	0.3
H(1) Flat Creek	53,960	0.6
J(1) Leadvale Creek	3,915	<0.1
K(1) Unnamed Creek	2,455	<0.1
b. Minor tributaries and immediate drainage (nonpoint load) -	146,700	1.6
c. Known municipal STP's -		
White Pine	2,860	<0.1
Dandridge	850	<0.1
Newport	23,805	0.3
Jefferson County Nursing Home	305	<0.1
Cosby High School	705	<0.1
Edgemont Elementary School	1,300	<0.1
Parrotsville Elementary and High School	1,690	<0.1
Centerview Elementary School	565	<0.1
Ramada Inn	985	<0.1
McDonald Elementary School	825	<0.1
d. Septic tanks* -	2,825	<0.1
e. Known industrial - See discussion, page 15.		
f. Direct precipitation** -	132,825	1.5
Totals	9,126,655	100.0

2. Output - A(1) French Broad River 7,702,060

3. Net annual N accumulation - 1,424,595

*Estimate based on 252 lakeside residences, 2 parks, and 1 camp.
**Estimated (see NES Working Paper No. 175).

D. Mean Annual Nonpoint Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
A(2) French Broad River	61	879
B(1) Long Creek	8	455
C(1) Nolichucky River	39	530
D(1) Clay Creek	19	569
E(1) Pigeon River*	103	1,128
G(1) Clear Creek*	105	993
H(1) Flat Creek	18	728
J(1) Leadvale Creek	15	584
K(1) Unnamed Creek	15	584

*Background levels for these tributaries are probably inflated by unmeasured industrial point sources upstream.

E. Yearly Loadings:

In the following table, the existing phosphorus loading is compared to the relationship proposed by Vollenweider (1975). Essentially, his "eutrophic" loading is that at which the receiving waters would become eutrophic or remain eutrophic; his "oligotrophic" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A "mesotrophic" loading would be considered one between "eutrophic" and "oligotrophic".

Note that Vollenweider's model may not apply to lakes with short hydraulic retention times or in which light penetration is severely restricted by high concentrations of suspended solids in the surface waters.

	Total Yearly Phosphorus Loading ($g/m^2/yr$)
Estimated loading for Douglas Lake	5.55
Vollenweider's "eutrophic" loading	1.31
Vollenweider's "oligotrophic" loading	0.66

V. LITERATURE REVIEWED

Byre, Bruce A. 1970. Summary of Observed Nutrient Concentrations and Nutrient Entrapment in TVA Reservoirs. In: TVA Activities Related to Study and Control of Eutrophication in the Tennessee Valley. National Fertilizer Development Center, Muscle Shoals, Alabama. April 1970. pp. 34-51.

Tennessee Department of Public Health. 1975. Water Quality Management Plan for the French Broad River Basin. Division of Water Quality Control, Nashville, Tennessee.

Tennessee Valley Authority. 1973. Water Quality in the Tennessee Valley. Division of Environmental Planning, Water Quality Branch, Paper #E-WQ-73-1. Chattanooga, Tennessee.

U.S. Environmental Protection Agency. 1975. National Eutrophication Survey Methods 1973-1976. Working Paper No. 175. National Environmental Research Center, Las Vegas, Nevada, and Pacific Northwest Environmental Research Laboratory, Corvallis, Oregon.

Vollenweider, R. A. 1975. Input-Output Models with Special Reference to the Phosphorus Loading Concept in Limnology. Schweiz. Z. Hydrol. 37:53-84.

VI. APPENDICES

APPENDIX A

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR TENNESSEE 09/13/76

LAKE CODE 4711 DOUGLAS LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 11766.4

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
4711A1	11766.4	208.13	228.23	210.11	130.26	113.55	170.75	166.22	195.95	181.51	191.14	205.01	189.44	182.27
4711A2	4812.2	98.83	118.08	129.41	112.70	88.63	67.39	64.85	63.71	58.69	53.52	55.50	76.17	81.43
4711B1	92.2	1.13	1.58	1.74	1.01	0.77	0.59	0.76	0.72	0.31	0.46	0.56	1.14	0.89
4711C1	4548.0	88.91	116.38	116.95	91.46	68.53	48.70	48.42	41.91	32.56	30.58	37.10	57.20	64.61
4711D1	46.4	1.14	1.39	1.57	1.16	0.91	0.69	0.69	0.59	0.39	0.38	0.47	0.87	0.85
4711E1	1784.5	43.32	48.70	60.03	46.16	41.06	32.85	31.71	25.94	18.75	17.58	17.41	57.20	36.72
4711G1	26.9	0.66	0.80	0.91	0.67	0.53	0.40	0.48	0.34	0.23	0.22	0.27	0.52	0.50
4711H1	74.1	1.82	2.21	2.51	1.85	1.46	1.10	1.10	0.94	0.63	0.60	0.74	1.40	1.36
4711J1	6.7	0.082	0.114	0.126	0.073	0.055	0.089	0.055	0.052	0.022	0.033	0.040	0.082	0.068
4711K1	4.2	0.052	0.073	0.088	0.062	0.035	0.027	0.035	0.033	0.014	0.021	0.025	0.052	0.042
4711ZZ	251.2	6.80	8.69	9.80	6.65	5.18	3.96	4.30	3.79	2.20	2.43	2.97	5.78	5.20

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 11766.4
SUM OF SUB-DRAINAGE AREAS = 11646.5

TOTAL FLOW IN = 2386.15
TOTAL FLOW OUT = 2190.31

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4711A1	4	73	237.295	14	73.057				
	5	73	305.822	15	217.473				
	6	73	317.149	19	308.654				
	7	73	192.555	24	305.057				
	8	73	301.631	23	713.584				
	9	73	232.764	20	198.218				
	10	73	159.707	17	166.780				
	11	73	119.497	20	113.267				
	12	73	240.976	18	317.149				
	1	74	557.842	17	707.921				
	2	74	368.119	7	461.564	21	356.792		
	3	74	221.438	7	209.262	21	0.0		
4711A2	4	73	178.962	14	138.469				
	5	73	192.555	15	124.594				
	6	73	136.487	19	111.285				
	7	73	94.012	24	109.303				
	8	73	68.527	23	48.705				
	9	73	40.774	20	15.688				
	10	73	34.547	17	23.560				
	11	73	76.455	20	85.800				
	12	73	135.638	18	60.881				
	1	74	247.489	17	176.980				
	2	74	197.935	7	213.226	21	127.709		
	3	74	133.089	7	122.895	21	308.654		

TRIBUTARY FLOW INFORMATION FOR TENNESSEE 09/13/76

LAKE CODE 4711 DOUGLAS LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
471181	4	73	3.171	14	1.996				
	5	73	2.823	15	2.359				
	6	73	1.996	19	2.166				
	7	73	1.161	24	1.382				
	8	73	1.337	23	1.053				
	9	73	0.411	20	0.394				
	10	73	0.371	17	0.328				
	11	73	0.983	20	0.328				
	12	73	1.320	18	0.262				
	1	74	3.681	17	2.158				
	2	74	2.832	7	2.390	21	1.371		
	3	74	2.529	7	2.888	21	20.162		
4711C1	4	73	142.717	14	102.790				
	5	73	139.885	15	104.206				
	6	73	94.861	19	122.329				
	7	73	51.537	24	45.024				
	8	73	50.687	23	41.059				
	9	73	33.980	20	31.149				
	10	73	44.741	17	31.715				
	11	73	61.731	20	33.697				
	12	73	137.337	18	72.208				
	1	74	178.962	17	117.798				
	2	74	171.600	7	159.990	21	127.709		
	3	74	157.725	7	132.806	21	467.228		
471101	4	73	1.603	14	1.002				
	5	73	1.419	15	1.186				
	6	73	1.002	19	1.090				
	7	73	0.583	24	0.725				
	8	73	0.671	23	0.530				
	9	73	0.354	20	0.575				
	10	73	0.268	17	0.240				
	11	73	0.583	20	0.127				
	12	73	1.260	18	0.592				
	1	74	2.534	17	1.572				
	2	74	2.042	7	1.917	21	1.232		
	3	74	1.637	7	1.314	21	7.532		
4711E1	4	73	58.616	14	47.289				
	5	73	57.766	15	60.881				
	6	73	45.590	19	49.554				
	7	73	25.060	24	27.666				
	8	73	25.882	23	20.360				
	9	73	14.951	20	32.281				
	10	73	13.790	17	13.592				
	11	73	17.846	20	3.511				
	12	73	49.839	18	34.263				
	1	74	98.543	17	75.040				
	2	74	78.721	7	80.703	21	55.501		
	3	74	58.899	7	48.705	21	161.123		

TRIBUTARY FLOW INFORMATION FOR TENNESSEE 09/13/76

LAKE CODE 4711 DOUGLAS LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4711G1	4	73	0.932	14	0.932				
	5	73	0.824	15	0.688				
	6	73	0.583	19	0.634				
	7	73	0.340	24	0.405				
	8	73	0.391	23	0.309				
	9	73	0.206	16	0.203				
	10	73	0.156	17	0.140				
	11	73	0.340	20	0.074				
	12	73	0.733	18	0.345				
	1	74	1.472	17	0.912				
	2	74	1.186	7	1.113	21	0.716		
	3	74	0.951	7	0.762	21	4.389		
4711H1	4	73	2.560	14	1.603				
	5	73	2.268	15	1.894				
	6	73	2.735	19	1.741				
	7	73	0.934	24	1.110				
	8	73	1.076	23	0.847				
	9	73	0.566	16	0.558				
	10	73	0.428	17	0.385				
	11	73	0.932	20	0.202				
	12	73	2.064	18	0.949				
	1	74	4.049	17	2.512				
	2	74	3.256	7	3.058	21	1.968		
	3	74	2.616	7	2.098	21	12.035		
4711J1	4	73	0.230	14	0.144				
	5	73	0.204	15	0.170				
	6	73	0.144	19	0.157				
	7	73	0.084	24	0.100				
	8	73	0.110	23	0.115				
	9	73	0.051	16	0.050				
	10	73	0.039	17	0.035				
	11	73	0.084	20	0.018				
	12	73	0.181	18	0.085				
	1	74	0.365	17	0.226				
	2	74	0.294	7	0.275	21	0.177		
	3	74	0.235	7	0.189	21	1.082		
4711K1	4	73	0.147	14	0.092				
	5	73	0.130	15	0.109				
	6	73	0.092	19	0.100				
	7	73	0.054	24	0.064				
	8	73	0.062	23	0.029				
	9	73	0.033	16	0.032				
	10	73	0.025	17	0.022				
	11	73	0.054	20	0.012				
	12	73	0.116	18	0.054				
	1	74	0.232	17	0.144				
	2	74	0.187	7	0.176	21	0.113		
	3	74	0.150	7	0.123	21	0.702		

TRIBUTARY FLOW INFORMATION FOR TENNESSEE 09/13/76

LAKE CODE 4711 DOUGLAS LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4711ZZ	4	73	12.799						
	5	73	11.327						
	6	73	8.014						
	7	73	6.201						
	8	73	5.380						
	9	73	2.240						
	10	73	1.815						
	11	73	4.304						
	12	73	7.702						
	1	74	17.500						
	2	74	13.847						
	3	74	11.610						

APPENDIX C

PHYSICAL AND CHEMICAL DATA

STORET RETRIEVAL DATE 76/09/10

471101
36 04 36.0 083 15 05.0 3
DOUGLAS LAKE
47089 TENNESSEE

040391

11EPALES 2111202
0031 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/25	10	15 0000	21.6		50	160	7.80	46	0.080	0.500	0.370	0.035
	10	15 0004	21.5	8.2		160	7.70	46	0.070	0.300	0.360	0.017
	10	15 0015	20.8	8.0		175	7.60	47	0.070	0.200	0.370	0.017
	10	15 0029	20.1	7.4		175	7.60	47	0.070	0.300	0.380	0.019
73/08/23	11	15 0000	25.5	7.2	30	179	7.50	43	0.090	0.500	0.240	0.017
	11	15 0007	24.8			183						
	11	15 0015	24.1	6.2		198	6.90	45	0.090	0.300	0.390	0.010
	11	15 0026	23.3	6.0		224	7.00	35	0.130	0.300	0.560	0.020

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/25	10	15 0000	0.054	8.3
	10	15 0004	0.057	
	10	15 0015	0.043	
	10	15 0029	0.074	
73/08/23	11	15 0000	0.048	8.6
	11	15 0015	0.059	
	11	15 0026	0.060	

STORET RETRIEVAL DATE 76/09/10

471102
36 02 30.0 083 20 20.0 3
DOUGLAS RESERVOIR
47089 TENNESSEE

040391

11EPALES 2111202
0056 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/25	10 45	0000	21.2		55	150	7.90	48	0.040	0.200	0.340	0.008
	10 45	0004	21.2	8.6		150	7.80	48	0.040	0.200	0.340	0.009
	10 45	0015	20.4	8.2		150	7.70	52	0.050	0.200	0.370	0.011
	10 45	0030	19.2	7.0		150	7.60	53	0.070	0.200	0.400	0.021
	10 45	0054	15.6	6.6		150	7.40	58	0.270	0.400	0.410	0.035
73/08/23	10 35	0000	26.8	6.2	54	168	8.00	44	0.080	0.500	0.120	0.004
	10 35	0015	26.7	6.0		168	7.30	41	0.080	0.300	0.110	0.004
	10 35	0030	26.3	4.2		182	7.20	41	0.100	0.300	0.290	0.005
	10 35	0044	24.7			198						
	10 35	0050	24.6	1.1		200	6.90	38	0.220	0.500	0.490	0.014
73/10/27	10 10	0000	19.0		54	195	8.10	46	0.050	0.500	0.250	0.015
	10 10	0005	19.0	8.8		192	8.10	46	0.040	0.500	0.230	0.013
	10 10	0015	16.9	6.6		297	7.30	50	0.180	0.700	0.400	0.023
	10 10	0023	16.4	6.0		308	7.20	50	0.220	0.800	0.430	0.030

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/25	10 45	0000	0.023	1.8
	10 45	0004	0.019	
	10 45	0015	0.022	
	10 45	0030	0.029	
	10 45	0054	0.047	
73/08/23	10 35	0000	0.020	5.5
	10 35	0015	0.021	
	10 35	0030	0.023	
	10 35	0050	0.083	
73/10/27	10 10	0000	0.044	5.8
	10 10	0005	0.040	
	10 10	0015	0.099	
	10 10	0023	0.125	

STORET RETRIEVAL DATE 76/09/10

471103
36 00 50.0 083 24 45.0 3
DOUGLAS RESERVOIR
47089 TENNESSEE

040392

11EPALES 2111202
0076 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/25	13	05 0000	21.9		72	150	7.90	56	0.060	0.400	0.380	0.011
	13	05 0004	21.6	9.0		150	7.80	38	0.030	0.480	0.350	0.014
	13	05 0015	20.0	7.8		150	7.60	40	0.050	0.300	0.380	0.010
	13	05 0035	17.8	6.4		150	7.50	40	0.110	0.300	0.420	0.020
	13	05 0050	14.4	6.6		140	7.50	36	0.140	0.400	0.540	0.022
	13	05 0093	13.0	4.6		150	7.40	42	0.290	0.600	0.460	0.041
73/08/23	10	00 0000	26.9	7.8	75	167	7.80	46	0.060	0.300	0.170	0.005
	10	00 0015	26.9			167						
	10	00 0033	26.4	1.0		178	7.00	43	0.070	0.200K	0.460	0.004
	10	00 0046	25.2			180						
	10	00 0060	24.4	0.1		181	6.90	46	0.300	0.600	0.380	0.008
	10	00 0079	22.8	0.1		188	6.80	60	0.850	1.300	0.080	0.008
73/10/27	09	41 0000	20.4		48	187	7.50	43	0.040	0.400	0.240	0.011
	09	41 0005	20.4	6.6		182	7.40	43	0.050	0.300	0.230	0.011
	09	41 0015	20.2	6.6		185	7.30	42	0.050	0.300	0.230	0.013
	09	41 0030	19.2	6.0		201	7.20	43	0.110	0.480	0.260	0.013
	09	41 0040	18.2	5.2		227	7.00	47	0.170	0.500	0.320	0.018
	09	41 0049	17.3	3.8		251	6.90	50	0.240	0.700	0.370	0.021

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/25	13	05 0000	0.026	2.4
	13	05 0004	0.026	
	13	05 0015	0.023	
	13	05 0035	0.040	
	13	05 0050	0.036	
	13	05 0093	0.062	
73/08/23	10	00 0000	0.015	4.2
	10	00 0033	0.015	
	10	00 0060	0.052	
	10	00 0079	0.091	
73/10/27	09	41 0000	0.020	6.0
	09	41 0005	0.021	
	09	41 0015	0.021	
	09	41 0030	0.041	
	09	41 0040	0.071	
	09	41 0049	0.111	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/10

471104
35 57 00.0 083 24 45.0 3
DOUGLAS RESERVOIR
47089 TENNESSEE

040391

11EPALES 2111202
0076 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/25	13	45 0000	22.8		72	150	8.20	42	0.040	0.600	0.350	0.024
	13	45 0004	22.2	9.4		150	8.40	42	0.040	0.400	0.360	0.004
	13	45 0015	20.4	8.6		150	7.90	41	0.030	0.400	0.370	0.007
	13	45 0030	17.6	6.6		150	7.70	40	0.040	0.300	0.540	0.014
	13	45 0050	15.4	6.6		145	7.50	41	0.060	0.300	0.580	0.020
	13	45 0075	13.6	6.8		150	7.50	44	0.080	0.400	0.620	0.022
73/08/23	09	25 0000	27.1	6.6	60	164	8.20	47	0.060	0.400	0.100	0.007
	09	25 0015	27.1			162						
	09	25 0030	26.7	1.8		176	7.30	46	0.090	0.200	0.340	0.005
	09	25 0046	25.3	0.1		176	6.90	45	0.080	0.300	0.440	0.005
	09	25 0052	25.1			176						
	09	25 0062	24.2	0.1		155	6.90	52	0.250	0.400	0.220	0.005
73/10/27	09	14 0000	21.0		48	177	7.30	46	0.050	0.400	0.240	0.014
	09	14 0005	21.0	6.2		177	7.30	44	0.040	0.300	0.240	0.014
	09	14 0015	21.0	6.4		175	7.30	44	0.040	0.300	0.240	0.012
	09	14 0030	20.9	6.6		175	7.40	44	0.050	0.300	0.230	0.014
	09	14 0040	20.5	6.8		175	7.40	46	0.110	0.400	0.150	0.014

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/25	13	45 0000	0.029	3.7
	13	45 0004	0.022	
	13	45 0015	0.024	
	13	45 0030	0.020	
	13	45 0050	0.033	
	13	45 0075	0.040	
73/08/23	09	25 0000	0.013	5.8
	09	25 0030	0.011	
	09	25 0046	0.018	
	09	25 0062	0.033	
73/10/27	09	14 0000	0.027	3.4
	09	14 0005	0.023	
	09	14 0015	0.019	
	09	14 0030	0.022	
	09	14 0040	0.043	

STORET RETRIEVAL DATE 76/09/10

471105
35 58 33.0 083 27 55.0 3
DOUGLAS RESERVOIR
47089 TENNESSEE

040391

11EPALES 2111202
0095 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00419 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/25	14 25	0000	21.9		70	145	8.00	42	0.040	0.700	0.480	0.007
	14 25	0004	21.4	9.0		140	8.00	42	0.030	0.400	0.380	0.006
	14 25	0015	19.8	8.0		150	7.60	42	0.050	0.200K	0.400	0.009
	14 25	0025	18.4	7.8		150	7.50	46	0.080	0.200K	0.460	0.020
	14 25	0040	16.1	6.0		150	7.50	52	0.060	0.200K	0.530	0.020
	14 25	0065	14.4	6.6		150	7.40	44	0.070	0.200K	0.610	0.022
	14 25	0092	12.8	6.0		150	7.40	48	0.080	0.300	0.470	0.026
73/08/22	16 20	0000	27.4		65	161	8.60	44	0.060	0.300	0.110	0.008
	16 20	0015	27.2			163						
	16 20	0030	27.1	5.8		163	7.60	43	0.060	0.200	0.140	0.008
	16 20	0045	25.5	0.1		182	7.00	42	0.150	0.300	0.550	0.010
	16 20	0070	24.0	0.1		169	6.90	43	0.190	0.500	0.450	0.017
	16 20	0080	23.2			168						
	16 20	0095	21.5	0.1		164	6.90	55	0.750	1.200	0.060	0.009
73/10/27	08 45	0000	21.0		48	177	7.40	48	0.050	0.300	0.290	0.014
	08 45	0005	21.0	6.0		177	7.50	46	0.040	0.200	0.200	0.012
	08 45	0015	21.0	5.8		179	7.40	47	0.040	0.300	0.270	0.019
	08 45	0030	20.9	6.0		178	7.30	46	0.050	0.200K	0.260	0.014
	08 45	0050	19.2	4.8		201	7.10	45	0.160	0.400	0.290	0.018
	08 45	0065	18.2	3.0		215	7.00	44	0.230	0.500	0.330	0.020

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/25	14 25	0000	0.023	2.7
	14 25	0004	0.022	
	14 25	0015	0.022	
	14 25	0025	0.027	
	14 25	0040	0.031	
	14 25	0065	0.034	
	14 25	0092	0.036	
73/08/22	16 20	0000	0.014	5.2
	16 20	0030	0.016	
	16 20	0045	0.023	
	16 20	0070	0.046	
	16 20	0095	0.070	
73/10/27	08 45	0000	0.019	1.7
	08 45	0005	0.018	
	08 45	0015	0.020	
	08 45	0030	0.018	
	08 45	0050	0.046	
	08 45	0065	0.098	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/10

471106
35 57 47.0 083 31 57.0 3
DOUGLAS RESERVOIR
47155 TENNESSEE

040391

11EPALES 2111202
0100 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/25	15 50	0000	21.6		59	150	7.80	47	0.160	0.500	0.550	0.007
	15 50	0004	20.1	9.0		145	7.80	49	0.040	0.300	0.420	0.003
	15 50	0015	19.7	8.8		145	7.80	54	0.050	0.200	0.450	0.010
	15 50	0025	18.2	7.4		145	7.69	53	0.050	0.200	0.450	0.007
	15 50	0040	16.3	7.4		150	7.50	50	0.070	0.200	0.500	0.013
	15 50	0065	14.3	7.4		148	7.50	48	0.060	0.200	0.690	0.024
	15 50	0095	12.7	6.8		140	7.40	51	0.070	0.200	0.700	0.028
73/08/22	15 30	0000	27.3	6.6	76	155	8.30	49	0.060	0.500	0.140	0.005
	15 30	0015	27.1			158						
	15 30	0040	27.0	6.4		158	7.90	44	0.080	0.400	0.140	0.019
	15 30	0052	25.7	0.6		173	6.80	48	0.080	0.400	0.450	0.012
	15 30	0070	24.2			146						
	15 30	0095	21.3	0.1		163	6.70	53	0.530	0.900	0.090	0.013
	15 30	0115	17.1	0.0		174	7.10	56	1.710	2.300	0.080	0.083
73/10/27	08 16	0000	21.2		36	182	7.20	42	0.050	0.400	0.320	0.016
	08 16	0005	21.2	4.8		182	7.10	42	0.040	0.200	0.310	0.014
	08 16	0015	21.2	4.8		180	7.10	44	0.040	0.200	0.310	0.013
	08 16	0030	21.2	4.6		182	7.10	45	0.040	0.200	0.320	0.015
	08 16	0050	20.8	3.8		190	7.00	45	0.080	0.300	0.330	0.016
	08 16	0078	19.3	3.6		201	7.00	46	0.220	0.500	0.320	0.017

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/25	15 50	0000	0.019	4.2
	15 50	0004	0.019	
	15 50	0015	0.020	
	15 50	0025	0.017	
	15 50	0040	0.021	
	15 50	0065	0.033	
	15 50	0095	0.033	
73/08/22	15 30	0000	0.010	7.0
	15 30	0040	0.021	
	15 30	0052	0.022	
	15 30	0095	0.088	
	15 30	0115	0.240	
73/10/27	08 16	0000	0.026	1.1
	08 16	0005	0.023	
	08 16	0015	0.023	
	08 16	0030	0.025	
	08 16	0050	0.034	
	08 16	0078	0.051	

APPENDIX D

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/09/09

47111A1
35 57 30.0 083 32 48.0 4
FRENCH BROAD RIVER
47 7.5 DOUGLAS DAM
0/DOUGLAS LAKE 040391
RT 66 BRDG BELO DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	09	50	0.600	2.200	0.160	0.033	0.080
73/05/15	11	15	0.600	0.210	0.022	0.019	0.040
73/06/19	09	10	0.580	2.100	0.052	0.031	0.045
73/07/24	09	25	0.440	1.050	0.490	0.005K	0.030
73/08/23	10	00	0.300	0.720	0.198	0.007	0.020
73/09/20	09	30	0.086	0.370	0.113	0.005K	0.020
73/10/17	09	35	0.350	0.350	0.048	0.011	0.025
73/11/20	09	35	0.390	0.300	0.072	0.008	0.065
73/12/18	09	15	0.540	0.700	0.152	0.024	0.050
74/01/17	09	30	0.600	1.800	0.580	0.020	0.080
74/02/07	09	25	0.630	0.300	0.095	0.020	0.060
74/02/21	09	20	0.588	0.700	0.045	0.020	0.050
74/03/07	09	20	0.560	0.300	0.050	0.020	0.060

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/09

4711A2
36 58 55.0 083 09 37.0 4
FRENCH BROAD RIVER
47 7.5 NEWPORT
I/DOUGLAS LAKE 051492
US 411 BRDG 1.5 MI NE OF NEWPORT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	13 47		0.399	0.440	0.077	0.019	0.065
73/05/15	12 00		0.350	1.900	0.054	0.021	0.095
73/06/19	12 00		0.450	3.100	0.126	0.037	0.080
73/07/24	12 15		0.340	1.680	0.420	0.036	0.125
73/08/23	12 45		0.470	0.580	0.063	0.060	0.125
73/09/20	12 36		0.580	1.260	0.100	0.060	0.175
73/10/17	12 25		0.330	2.800	0.126	0.056	0.155
73/11/20	11 55		0.340	0.925	0.264	0.068	
73/12/18	12 05		0.470	0.500	0.096	0.044	0.090
74/01/17	12 20		0.540	0.300	0.056	0.024	0.095
74/02/07	11 50		0.580	0.700	0.055	0.025	0.070
74/02/21	11 35		0.500	0.700	0.040	0.025	0.085
74/03/07	12 00		0.400	0.700	0.030	0.030	0.170

37

STORET RETRIEVAL DATE 76/09/09

471181
36 07 55.0 083 14 05.0 4
LONG CREEK (BAILEY BR)
47 HAMBLEM CO MAP
T/DOUGLAS LAKE 040392
SEC RD BRDG 5 MI SE MORRISTOWN
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	15 00		1.100	0.160	0.015	0.007	0.015
73/05/15	13 10		1.120	0.575	0.011	0.010	0.025
73/06/19	13 50		1.260	0.190	0.017	0.009	0.029
73/07/24	13 30		1.100	0.800	0.357	0.014	0.040
73/08/23	13 55		1.020	0.420	0.050	0.012	0.020
73/09/20	13 35		0.790	1.050	0.220	0.015	0.025
73/10/17	13 25		0.600	0.350	0.022	0.016	0.040
73/11/20	12 55		0.300	0.250	0.020	0.005K	0.035
73/12/18	13 05		0.950	0.200	0.012	0.012	0.012
74/01/17	13 15		1.400	0.400	0.012	0.016	0.030
74/02/07	13 10		1.260	0.300	0.025	0.010	0.030
74/02/21	12 40		1.100	0.500	0.012	0.010	0.015
74/03/07	13 05		0.570	1.500	0.020	0.030	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/09

4711C1
36 07 50.0 083 13 15.0 4
NOLICHUCKY RIVER
47 HAMBLEM CO MAP
T/DOUGLAS LAKE 040392
HWY BRDG 1 MI NE OF POINT PLEASANT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	14	42	0.680	0.260	0.034	0.017	0.045
73/05/15	13	00	0.530	0.240	0.012	0.019	0.060
73/06/19	13	40	0.640	0.560	0.044	0.035	0.125
73/07/24	13	10	0.470	0.580	0.200	0.020	0.100
73/08/23	13	45	0.560	0.920	0.058	0.019	0.090
73/09/20	13	25	0.620	0.400	0.048	0.037	0.135
73/10/17	12	12	0.450	0.750	0.215	0.035	0.145
73/11/20	12	45	0.084	0.150	0.012	0.008	0.055
73/12/18	12	55	0.660	1.400	0.048	0.040	0.075
74/01/17	13	05	0.970	0.500	0.032	0.020	0.070
74/02/07	13	00	0.850	0.400	0.020	0.015	0.060
74/02/21	12	25	0.780	0.400	0.015	0.015	0.060
74/03/07	13	00	0.640	0.800	0.020	0.030	

37

STORET RETRIEVAL DATE 76/09/09

471101
36 02 25.0 083 11 32.0 4
CLAY CREEK
47 7.5 RANKIN
T/DOUGLAS LAKE 040391
HANEY BRANCH RD BRDG 1 MI SW OF BYBEE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	14	13	0.015	0.240	0.012	0.005K	0.010
73/05/15	12	20	0.110	1.540	0.046	0.007	0.015
73/06/19	12	40	0.390	1.980	0.066	0.023	0.035
73/07/24	12	40	0.150	0.520	0.198	0.010	0.040
73/08/23	13	15	0.078	0.920	0.130	0.017	0.040
73/09/20	12	50	0.050	0.790	0.176	0.024	0.040
73/10/17	12	45	0.036	0.400	0.030	0.030	0.055
73/11/20	12	15	0.012	0.150	0.008	0.016	0.050
73/12/18	12	30	0.076	0.500	0.012	0.012	0.020
74/01/17	12	35	0.552	0.800	0.024	0.020	0.030
74/02/07	12	10	0.560	0.400	0.015	0.010	0.025
74/02/21	12	00	0.400	0.900	0.020	0.010	0.020
74/03/07	12	25	0.450	0.700	0.010	0.025	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/09

4711E1
36 58 06.0 083 06 15.0 4
PIGEON RIVER
47 7.5 NEWPORT
T/DOUGLAS LAKE 052092
BANK 4 MI N OF NEWPORT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	13	19	0.540	0.600	0.120	0.040	0.097
73/05/15	14	30	0.380	2.520	0.120	0.036	0.100
73/06/19	14	50	0.540	0.750	0.220	0.063	0.165
73/07/24	14	45	0.470	1.100	0.560	0.069	0.130
73/08/23	15	00	0.570	1.030	0.126	0.063	0.113
73/09/20	15	40	1.000	2.300	0.150	0.088	0.230
73/10/17	14	25	1.140	0.900	0.066	0.048	0.110
73/11/20	14	00	1.120	1.400	0.330	0.216	0.460
73/12/18	14	00	0.620	0.800	0.306	0.058	0.125
74/01/17	14	15	0.600	0.500	0.076	0.048	0.135
74/02/07	14	35	0.528	0.400	0.090	0.035	0.115
74/02/21	13	20	0.552	0.900	0.100	0.045	0.115
74/03/07	14	05	0.560	1.000	0.158	0.090	0.260

STORET RETRIEVAL DATE 76/09/09

47?1G1
35 55 50.0 083 20 40.0 4
CLEAR CREEK
47 7.5 CHESTNUT HIL
T/DOUGLAS LAKE 040391
BRDG SECONDAY RD W EDGE OF CHESTNUT HIL
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	10	55	1.080	0.540	0.025	0.060	0.130
73/05/15	11	55	1.100	0.740	0.031	0.021	0.040
73/06/19	10	05	1.140	0.270	0.018	0.063	0.105
73/07/24	11	15	0.960	0.520	0.230	0.077	0.100
73/08/23	10	45	1.020	0.480	0.085	0.215	0.240
73/09/16	10	20	0.860	1.760	0.066	0.100	0.120
73/10/17	10	30	1.100	0.150	0.038	0.115	0.145
73/11/20	10	15	1.010	0.300	0.026	0.136	0.180
73/12/18	10	10	1.700	3.000	0.176	0.352	0.680
74/01/17	10	30	1.680	0.900	0.052	0.132	0.270
74/02/07	10	20	1.180	0.600	0.030	0.035	0.090
74/02/21	10	15	1.040	0.550	0.035	0.040	0.075
74/03/07	10	15	0.950	0.500	0.020	0.060	0.145

STORET RETRIEVAL DATE 76/09/09

4711M1
35 54 45.0 083 26 50.0 4
FLAT CREEK
47 7.5 SHADY GROVE
T/DOUGLAS LAKE 040391
E DERRICK CEMETERY 12MI W FAIR GARDEN
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	11	15	0.820	0.210	0.063	0.008	0.015
73/05/15	11	15	0.810	0.140	0.009	0.008	0.020
73/06/19	10	25	1.020	0.890	0.038	0.021	0.035
73/07/24	14	35	0.780	1.100	0.670	0.011	0.045
73/08/23	11	05	0.570	0.960	0.073	0.017	0.030
73/09/16	10	40	0.560	0.580	0.028	0.015	0.030
73/10/17	10	50	0.470	0.300	0.035	0.019	0.025
73/11/20	10	35	0.340	0.100K	0.008	0.008	0.035
73/12/18	10	30	0.792	0.200	0.016	0.016	0.045
74/01/17	10	50	1.180	0.100	0.012	0.016	0.035
74/02/07	10	40	1.010	0.400	0.010	0.010	0.035
74/02/21	10	40	0.930	0.700	0.020	0.010	0.020
74/03/07	10	36	0.704	0.600	0.020	0.025	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/09

4711J1
36 06 18.0 083 15 55.0 4
LEADYALE CREEK
47 7.5 WHITE PINE
T/DOUGLAS LAKE 040391
BRDG SECONDARY RD 1MI ESE WHITE PINE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	15 30		0.357	0.520	0.082	0.023	0.040
73/05/15	14 05		0.350	0.950	0.078	0.007	0.030
73/06/19	14 15		0.410	0.580	0.027	0.021	0.035
73/07/24	13 45		0.082	2.730	1.370	0.012	0.055
73/08/23	14 15		0.130	1.050	0.168	0.008	0.020
73/09/16	14 00		0.126	1.600	0.965	0.016	0.060
73/10/17	13 50		0.520	1.180	0.100	0.015	0.080
73/11/20	13 15		0.570	1.250	0.128	0.008	0.090
73/12/18	13 25		0.132	0.100	0.020	0.016	0.040
74/01/17	13 45		0.616	0.500	0.014	0.020	0.030
74/02/07	13 40		0.792	0.500	0.020	0.015	0.035
74/02/21	12 50		0.620	1.100	0.015	0.010	0.070
74/03/07	13 20		0.560	1.000	0.060	0.075	0.160

STORET RETRIEVAL DATE 76/09/09

4711K1
36 01 30.0 083 24 11.0 4
UNNAMD CREEK
47 7.5 JEFFERSON CI
T/DOUGLAS LAKE 040392
BRDG ST RT 66A IN DANDRIDGE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/14	10	25	0.990	3.500	0.098	0.009	0.015
73/05/15	10	30	1.020	3.800	0.120	0.010	0.020
73/06/19	09	35	1.000	1.540	0.038	0.018	0.020
73/07/24	19	50	0.840	0.435	0.240	0.010	0.025
73/08/23	11	15	0.850	0.380	0.068	0.018	0.020
73/09/16	09	50	0.820	0.200	0.013	0.031	0.035
73/10/17	10	00	0.820	0.550	0.023	0.029	0.055
73/11/20	09	50	0.740	0.100K	0.012	0.005K	0.040
73/12/18	09	40	0.960	2.100	0.024	0.008	0.010
74/01/17	09	48	1.100	0.400	0.008	0.008	0.015
74/02/07	09	50	1.040	0.400	0.010	0.005K	0.005
74/02/21	09	50	1.060	0.400	0.030	0.005K	0.005
74/03/07	09	45	0.920	0.200	0.005	0.015	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/09

4711JA AS4711JA P001532
36 06 12.0 083 16 45.0 4
WHITE PINE
47 7.5 WHITE PINE
T/DOUGLAS LAKE 040391
LEADVALE CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/05	08 00								
CP(T)-			5.000	1.800	0.237	5.400	6.100	0.200	0.300
73/06/05	16 00								
73/07/18	08 00								
CP(T)-			5.200	2.800	0.040	14.000	15.000	0.100	0.170
73/07/18	16 00								
73/08/13	08 00								
CP(T)-			9.300	0.130	0.077	13.800	14.000	0.100	0.100
73/08/13	16 00								
73/09/10	08 00								
CP(T)-			37.200	0.650	0.126	28.500	28.500	0.100	0.100
73/09/10	16 00								
73/10/15	08 00								
CP(T)-			31.100	0.800	0.044	32.000	39.000	0.090	0.100
73/10/15	16 00								
73/11/07	08 00								
CP(T)-			20.400	0.950	0.054	20.500	21.500	0.100	0.100
73/11/07	16 00								
73/12/11	08 00								
CP(T)-			12.000	3.200	0.073	18.000	18.800	0.100	0.100
73/12/11	16 00								
74/01/02	08 00								
CP(T)-			4.200	0.500K	0.080	4.500	5.000	0.300	0.100
74/01/02	16 00								
74/02/05	08 00								
CP(T)-			6.100	1.000K	0.040K	4.400	5.300	0.500	0.300
74/02/05	16 00								
74/03/08	08 00								
CP(T)-			10.900	1.000K	0.069		8.100	0.300	0.300
74/03/08	16 00								
74/04/10	08 00								
CP(T)-			9.600	1.000K	0.064	4.500	4.700	0.300	0.300
74/04/10	16 00								
74/05/07	08 00								
CP(T)-			16.800	1.100	0.110	11.000	14.000	0.100	0.200
74/05/07	16 00								

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/09

4711JA AS4711JA P001532
36 06 12.0 083 16 45.0 4
WHITE PINE
47 7.5 WHITE PINE
T/DOUGLAS LAKE 040391
LEADVALE CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/06/11 CP(T)- 74/06/11	08 00 16 00		11.800	3.600	0.050	9.950	10.250	0.090	0.100

APPENDIX E

PARAMETRIC RANKINGS OF LAKES SAMPLED BY NES IN 1974

STATE OF TENNESSEE

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
4701	LAKE BARKLEY	0.128	0.480	473.381	12.723	10.400	0.047
4704	BOONE RESERVOIR	0.052	0.995	442.071	11.415	14.600	0.029
4706	CHEATHAM RESERVOIR	0.142	0.460	473.800	8.160	9.600	0.084
4707	CHEROKEE LAKE	0.051	0.780	448.667	12.162	15.000	0.022
4708	CHICKAMAUGA LAKE	0.031	0.440	463.833	3.111	9.600	0.012
4711	DOUGLAS LAKE	0.026	0.440	442.823	4.553	15.000	0.014
4712	FORT LOUDON RESERVOIR	0.054	0.550	465.571	4.776	12.600	0.025
4713	GREAT FALLS LAKE	0.020	0.405	444.417	3.983	14.800	0.007
4717	NICKAJACK RESERVOIR	0.051	0.495	459.833	2.742	9.700	0.025
4720	OLD HICKORY LAKE	0.058	0.330	469.769	8.931	9.400	0.019
4722	WATTS BAR RESERVOIR	0.032	0.510	462.250	5.550	11.000	0.012
4723	J. PERCY PRIEST RESERVOI	0.056	0.155	430.200	9.993	15.000	0.021
4724	TIM'S FORD RESERVOIR	0.021	0.445	398.167	6.739	14.900	0.009
4725	SOUTH HOLSTON LAKE	0.014	0.570	404.750	7.667	15.000	0.008
4727	REELFOOT LAKE	0.233	0.170	477.917	80.958	13.200	0.059
4728	WOODS RESERVOIR	0.017	0.320	429.083	7.392	15.000	0.005

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
4701	LAKE BARKLEY	13 (2)	40 (6)	13 (2)	7 (1)	73 (11)	13 (2)	159
4704	BOONE RESERVOIR	40 (6)	0 (0)	73 (11)	20 (3)	47 (7)	20 (3)	200
4706	CHEATHAM RESERVOIR	7 (1)	47 (7)	7 (1)	40 (6)	90 (13)	0 (0)	191
4707	CHEROKEE LAKE	50 (7)	7 (1)	53 (8)	13 (2)	13 (0)	40 (6)	176
4708	CHICKAMAUGA LAKE	67 (10)	63 (9)	33 (5)	93 (14)	90 (13)	70 (10)	416
4711	DOUGLAS LAKE	73 (11)	63 (9)	67 (10)	80 (12)	13 (0)	60 (9)	356
4712	FORT LOUDON RESERVOIR	33 (5)	20 (3)	27 (4)	73 (11)	60 (9)	27 (4)	240
4713	GREAT FALLS LAKE	87 (13)	73 (11)	60 (9)	87 (13)	40 (6)	93 (14)	440
4717	NICKAJACK RESERVOIR	50 (7)	33 (5)	47 (7)	100 (15)	80 (12)	33 (5)	343
4720	OLD HICKORY LAKE	20 (3)	80 (12)	20 (3)	33 (5)	100 (15)	53 (8)	306
4722	WATTS BAR RESERVOIR	60 (9)	27 (4)	40 (6)	67 (10)	67 (10)	70 (10)	331
4723	J. PERCY PRIEST RESERVOI	27 (4)	100 (15)	80 (12)	27 (4)	13 (0)	47 (7)	294
4724	TIM'S FORD RESERVOIR	80 (12)	53 (8)	100 (15)	60 (9)	33 (5)	80 (12)	406
4725	SOUTH HOLSTON LAKE	100 (15)	13 (2)	93 (14)	47 (7)	13 (0)	87 (13)	353
4727	REELFOOT LAKE	0 (0)	93 (14)	0 (0)	0 (0)	53 (8)	7 (1)	153
4728	WOODS RESERVOIR	93 (14)	87 (13)	87 (13)	53 (8)	13 (0)	100 (15)	433